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CHARACTERIZATION OF REGIONAL HETEROGENEITY IN LEFT ATRIAL RESERVOIR AND CONDUIT FUNCTION BY SPECKLE TRACKING ECHOCARDIOGRAPHY

ACC Oral Contributions
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Abstract Category: Tissue Imaging
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Background: Spatial anisotropy in left atrial (LA) tissue has been suggested as a key pre-requisite for atrial arrhythmias. The purpose of this study was to assess the LA mechanics using 2-dimensional speckle tracking strain imaging, focusing on the effects of mechanical dispersion on global LA size and function in atrial fibrillation (AF).

Methods: In 77 subjects, 41 with sinus rhythm (65±15 yrs,18 males) and 36 patients with chronic AF (74±9 yrs, 21 male), longitudinal strain (LS) and strain rate were obtained during left ventricular (LV) ejection (reservoir phase) and early diastole (conduit phase) from 12 segments of LA in apical 4-chamber and 2-chamber views.

Results: A wide dispersion of regional LA function was seen in controls ($p<0.002$, Fig. A). The standard deviation of LS (STDEV-LS) correlated with total LA emptying fraction ($r=0.80$, $p<0.001$, Fig. B). For enlarged LA (> 28 ml/m2), AF was associated with LV ejection fraction ($p=0.009$), LA volume ($p=0.05$) and STDEV-LS ($p=0.001$) on univariate analysis . However multiple logistic regression revealed STDEV-LS as the only independent predictor of absence of AF (odds ratio, 0.85; CI, 0.72-0.99; $p=0.04$).

Conclusion: Speckle tracking strain imaging provides unique insights into the spatial anisotropy in LA stretch and recoil mechanics seen during the reservoir and conduit phases of the cardiac cycle. In an enlarged LA, the loss of cyclical variations and spatial gradients of deformation rather than LA dimensions may provide key substrate for sustaining AF.

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